Remarks

This amendment is responsive to the official action mailed December 17, 2004 (Paper No. 2). Applicant has amended the Specification and submitted an Abstract in proper form as required. The claims have been amended, including by presentation of a new claim increasing the number of claims by one. However the number remains within that for which official fees have already been paid. No new matter is presented. Reconsideration and allowance are requested.

In the official action, the application was found to be lacking an Abstract as required. Applicant submits an Abstract in proper form.

Objection was made as to certain phrases on pages two and three of the Specification that were considered unclear. The noted phrases have been revised as suggested.

Regarding claim 15, objection was the reference to the "Fast newton algorithm," which should be – Fast Newton algorithm --. This correction has been made.

Claims 1-5, 8, 9 and 11 were rejected under 35 U.S.C. §103(a) over a combination of applicant's admissions regarding the prior art, and US 6,240,099 – Lim. Claims 6, 7 and 10 were rejected over that combination plus Tanner et al. (IEEE, Volterra Based Receivers, etc.). Claims 12-15 were rejected over the combination applied to claim 1 et al., in further view of Carayannis et al. (IEEE Fast Sequential Algorithm for Least-Squares, etc.).

The foregoing rejections each rely on a combination of applicant's characterization of the prior art, plus US 6,240,099 – Lim. However, that combination does not meet all the aspects of the independent claims. Therefore, applicant requests reconsideration and allowance of the pending claims. The differences between the invention and the prior art are such that the subject matter claimed, as a whole, is not shown to have been known or obvious.

As the examiner has pointed out at page 3 of the official action, applicant's characterization of the prior art (see Fig. 1) is a direct sequence code division multiple access receiver wherein an adaptive filter is controlled by an adaptive algorithm for

filtering data that has been multiplied by a spreading code and filtered by a channel filter.

The examiner has suggested in the official action that the admitted prior art also is characterized by an adaptive filter with a length appropriate to model the inverse of the channel filter. However this aspect is not in fact found in the prior art. Nor is it found in applicant's characterizations of the prior art. On the contrary, this aspect of the adaptive filter having a length appropriate to model the inverse of the channel filter, is an important difference over the prior art, and is particularly defined in independent claims 1 and 16. Accordingly, applicant's invention claimed as a whole is not in fact met by the prior art. Furthermore, the invention claimed as a whole is not shown to have been obvious.

Applicant's characterization of the prior art filter is found in the Specification at the paragraph bridging pages 2 and 3. The prior art filter has a length of N+P-1 chips, where N is the number of chips per data bit and P is the total number of chips in the code. Such a filter provides an output that can be down sampled to the bit rate at the synchronous points and subtracted from data received from a particular user, to give an adaptation error. The adaptation error is used for training the adaptive algorithm.

However the contents of such prior art filter change completely from one iteration to the next. As a result, its convergence is slow. It is not possible to use the FAEST or SFAEST algorithm because, as discussed in the specification, for example, at page 4, lines 4-26, these algorithms require a shift invariant property.

In the other prior art relied upon in the combination posited by the examiner for the rejection of claim 1 under 35 U.S.C. §103, namely US 6,240,099 – Lim et al., a receiver is disclosed with a Kalman filter used to model the channel. See col. 6, line 60 to col. 8, line 65 of Lim. A Kalman estimate is built by recursively estimating the coefficients of the multiple path channel.

In contrast, the filter of applicant's inventive receiver has a length appropriate to model the inverse of the channel. By cascading the channel with its inverse, the effect of channel distortion is reduced or eliminated. The aspect of the adaptive filter having a length appropriate to model the inverse of the channel filter, as pointed out above is an

important difference over the prior art, and is particularly defined in independent claims 1 and 16. Applicant's invention claimed as a whole is not met by the prior art and there is no basis to assert that the invention claimed as a whole would have been obvious.

Neither the admitted prior art as shown in applicant's Fig. 1 and as detailed in the specification, nor the Lim et al., reference cited by the examiner in combination with the admitted prior art, teaches or suggests using a filter adapted to model the inverse of he channel. Therefore, combining these two disclosures cannot result in the invention claimed as a whole. Even if it is possible in hindsight to identify a benefit to the combination apart from applicant's disclosure, the result would still fail to meet applicant's invention claimed as a whole. There is no apparent incentive that would lead a person of ordinary skill to modify the admitted prior art to substitute the multi-user detector of Lim et al., in any event.

All the claims incorporate this subject matter, now found in both independent claims 1 and 16. The invention claimed as a whole is not shown to have been known or obvious from a combination of the admitted prior art and US 6,240,099 – Lim et al. Likewise, none of the other prior art of record teaches or suggests the receiver filter as particularly and distinctly defined. As a result, the invention defined by claims 1-16, as a whole, is properly allowable.

New claim 16 incorporates the subject matter of claim 1, and further recites that the adaptive algorithm is trained at the chip rate of the code. This aspect also distinguishes over the admitted prior art as represented by applicant's Fig. 1 and as discussed in the specification, and over Lime et al., both of which are trained at the bit rate or symbol rate. (See, for example, applicant's specification at page 2, line 32, and Lim et al. at col. 5, line 33, which states that sampling takes place at a rate of $1/T_S$. The faster training is achieved by sampling the spread-multiplied data from one or all of the users. In the example given in the present application, where P=16, training of the algorithm takes place 16 times as fast as in the prior art. Other things being equal, the result is a much faster rate of convergence. There is no suggestion in the prior art to lead a person of ordinary skill along these lines, yet there was a substantial benefit to be obtained if indeed such a change had been obvious. There is no basis of record to

conclude the applicant's invention claimed as a whole would have been known or obvious. Claim 16 is allowable independently for these reasons, and also by virtue of the aspects that are recited in both claim 16 and claim 1.

The disclosure and claims are in proper form. The differences between the invention and the prior art are such that the subject matter claimed, as a whole, is not shown to have been known or obvious. Therefore, claims 1-16 are in condition for allowance and allowance is hereby requested.

Respectfully submitted,

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